

I/WE CLAIM:

1. A method of emulating Virtual Provide Local Area Network Service (VPLS) in an Asynchronous Transfer Mode (ATM) network, comprising the steps of:

configuring at a plurality of provider edge devices (PEs) a VPLS having a VPLS Identifier (ID);

exchanging information between the PEs indicating a respective ATM address at each PE which is associated with the VPLS; and

for each pair of PEs, establishing a respective virtual circuit between the pair of PEs using the respective ATM address of each PE as endpoints of the virtual circuit.

2. The method of claim 1 wherein at each PE, the respective ATM address associated with the VPLS is unique to the VPLS.

3. The method of claim 1 wherein a second VPLS is emulated at a plurality of the PEs, and wherein at each such PE the respective ATM address associated with the VPLS is also associated with the second VPLS.

4. The method of claim 1 wherein the PEs are arranged in a Private Network-Network Interface (PNNI) hierarchy, and wherein the step of exchanging information between the PEs comprises the steps of:

at each PE, generating a PNNI Topology State Element (PTSE) including a VPLS Information Group (IG), the VPLS IG indicating the VPLS ID and the ATM address to be associated with the VPLS; and

flooding each VPLS IG throughout the PNNI hierarchy.

5. The method of claim 4 wherein the step of flooding each VPLS IG throughout the PNNI hierarchy comprises the steps of:

at each PE, flooding the PTSE throughout a peer group of the PE, each peer group having a peer group leader;

at each peer group leader, receiving each PTSE generated by a PE within the peer group of the peer group leader and flooding such PTSEs throughout a parent logical group of the peer group leader;

at each peer group leader, receiving at least one other PTSE, each other PTSE containing a VPLS IG indicating an association between the VPLS ID and an ATM address, from the parent logical group of the peer group leader; and

at each peer group leader, flooding the at least one other PTSE throughout the peer group of the peer group leader.

6. The method of claim 1 wherein the step of exchanging information between the PEs comprises the steps of:

at each PE, generating a PNNI Augmented Routing (PAR) Service IG including the VPLS ID and the ATM address to be associated with the VPLS; and

flooding each PAR Service IG throughout the ATM network.

7. The method of claim 6 wherein at least one other PE uses Proxy PAR to exchange with PEs ATM addresses to be associated with the VPLS.

8. The method of claim 7 wherein the at least one other PE is attached to the ATM network via an ATM link employing an ATM User Network Interface (UNI) signaling protocol.

9. The method of claim 7 wherein the at least one other PE is attached to the ATM network via an ATM link employing an ATM Inter-Network Interface (AINI) signaling protocol.

10. A method of advertising a service having a service identifier (ID) within an Asynchronous Transfer Mode (ATM) network, the ATM network including a

plurality of nodes arranged in a Private Network-Network Interface (PNNI) hierarchy, the method comprising the steps of:

at each node which supports the service, generating a PNNI Topology State Element (PTSE) including a service Information Group (IG), the service IG indicating the service ID and an ATM address to be associated with the service; and

flooding each PTSE throughout the PNNI hierarchy.

11. The method of claim 10 wherein the step of flooding each PTSE throughout the PNNI hierarchy comprises:

at each PE, flooding the PTSE throughout a peer group of the PE, each peer group having a peer group leader;

at each peer group leader, receiving each PTSE generated by a PE within the peer group of the peer group leader and flooding such PTSEs throughout a parent logical group of the peer group leader;

at each peer group leader, receiving at least one other PTSE, each other PTSE containing a service IG indicating an association between the service ID and an ATM address, from the parent logical group of the peer group leader; and

at each peer group leader, flooding the at least one other PTSE throughout the peer group of the peer group leader.

12. A method of emulating a Virtual Private Local Area Network Service (VPLS) at a Provider Edge device (PE) within an Asynchronous Transfer Mode (ATM) network, comprising the steps of:

configuring at the PE a VPLS Identifier (ID) associated with the VPLS, including associating an ATM address with the VPLS ID;

advertising the association between the VPLS ID and the ATM address to other nodes within the ATM network;

determining other ATM addresses within the ATM network which are associated with the VPLS;

for each such other ATM address, determining whether the PE is to set up a virtual circuit with the ATM address; and

for each such other ATM address with which the PE determines that the PE is to set up a virtual circuit, setting up a virtual circuit with the other ATM address.

13. The method of claim 12 wherein the step of advertising the association between the VPLS ID and the ATM address further comprises advertising at least one traffic characteristic to be associated with the VPLS ID and the ATM address.

14. The method of claim 13 wherein the step of setting up a virtual circuit comprises setting up the virtual circuit in conformance with the at least one traffic characteristic.

15. The method of claim 12 wherein the node is part of a Private Network-Network Interface (PNNI) hierarchy, and wherein the step of advertising the association between the VPLS ID and the ATM address to other nodes within the VPLS comprises the steps of:

generating a PNNI Topology State Element (PTSE) including a VPLS information group (IG), the VPLS IG indicating the VPLS ID and the ATM address associated with the VPLS; and

flooding the PTSE throughout the peer group of the node.

16. The method of claim 12 wherein the step of advertising the association between the VPLS ID and the ATM address comprises the steps of:

generating a Private Network-Network Interface (PNNI) Augmented Routing (PAR) Service information group (IG) including the VPLS ID and the ATM address; and

flooding the PAR Service IG throughout the ATM network.

17. A node within an Asynchronous Transfer Mode (ATM) network, comprising:

means for receiving a Virtual Private Local Area Network Service (VPLS) identifier (ID); and

a VPLS controller comprising:

instructions for associating an ATM address with the VPLS ID;

instructions for advertising the association between the ATM address and the VPLS ID to other nodes within the ATM network;

instructions for determining other ATM addresses within the ATM network which are associated with the VPLS ID;

instructions for, for each such other ATM address, determining whether the node is to set up a virtual circuit with the other ATM address; and

instructions for, for each such other ATM address that the node determines that the node is to set up a virtual circuit, setting up a virtual circuit with the other ATM address.

18. The node of claim 17 wherein the node is part of a Private Network-Network Interface (PNNI) hierarchy, and wherein the instructions for advertising the association between the ATM address and the VPLS ID comprise:

instructions for generating a PNNI Topology State Element (PTSE) including a VPLS information group (IG), the VPLS IG indicating the VPLS ID and the ATM address associated with the VPLS; and

instructions for flooding the PTSE throughout a peer group of the node.

19. The node of claim 17 wherein the node is part of a Private Network-Network Interface (PNNI) hierarchy, and wherein the instructions for advertising the association between the ATM address and the VPLS ID comprise:

instructions for generating a PNNI Augmented Routing (PAR) Service information group (IG), the PAR service IG including the VPLS ID and the ATM address to be associated with the VPLS; and

instructions for flooding the PAR service IG throughout the ATM network.

20. The node of claim 17 wherein the instructions for advertising the association between the ATM address and the VPLS ID comprise instructions for delivering the association to a second node using Proxy PAR.

21. A node within an Asynchronous Transfer Mode (ATM) network, the node being part of a Private Network-Network Interface (PNNI) hierarchy within the ATM network and comprising:

instructions for receiving a service identifier (ID) identifying a service;

instructions for generating a PNNI Topology State Element (PTSE) including a service information group (IG), the service IG indicating the service ID and an ATM address to be associated with the service; and

instructions for flooding the service IG throughout the PNNI hierarchy.

22. A logical group node within a Private Network-Network Interface (PNNI) hierarchy in an Asynchronous Transfer Mode (ATM) network, the

logical group node having a peer group and a child peer group, and comprising:

instructions for receiving at least one PNNI Topology State Element (PTSE) from nodes within the child peer group, each PTSE including a Virtual Private Local Area Network Service (VPLS) information group (IG), each VPLS IG indicating an association between a VPLS identifier (ID) and an ATM address;

instructions for flooding each of the at least one PTSE throughout the peer group;

instructions for receiving at least one other PTSE from other logical group nodes within the peer group, each PTSE including a VPLS IG indicating an association between the VPLS ID and an ATM address;

instructions for flooding each of the at least one other PTSE throughout the child peer group.